SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advanced Technologies (1)

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OPTICALLY CONTROLLED BEAM FORMING NETWORK FOR MULTIPLE BEAM ANTENNA

Abstract

For the future broad band satellite communications, a large number of multiple beam antenna will be important role for a satellite antenna. The large number of multiple beam antenna should need a large scale and complex beam forming network(BFN). For the solution of this problem, we have developed the test model of an optically controlled BFN and presented the summary and the test results in 61th IAC. After that, we have improved the test model and performed additional tests. The optically controlled transmit BFN comprises electro-optic converters, an optically controlled BFN and opto-electronic converters. The electro-optic converter comprises a laser, an optical modulator and an optical amplifier. The optically controlled BFN comprises a collimator, an optical filter, an amplitude-only spatial light modulator, a phase-only spatial light modulator, a microlens array and a 2-D fiber array, and WDM couplers. In this BFN we have improved the optical filter and the collimator. For the demonstration of the BFN, we assumed an offset paraboloidal reflector antenna of two meters in diameter with 404 primary radiators having 20 multiple spot beams. we have developed the test model of an optically controlled transmit BFN for this antenna and confirmed good agreement between expected radiation patterns and calculated radiation patterns using measured BFN data. Furthermore, we have performed the communication test such as the bit error rate(BER) test in the digital communication link. We have confirmed that this BFN had no serious effect for BER performance.